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Manganese and trace metal cycling in the deeps of the Baltic Sea

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The currently euxinic deeps of the central Baltic Sea are hotspots of intense microbial activity and biogeochemical cycling of nutrients and redox-sensitive elements. A prominent feature forms the pelagic redoxcline separating oxic surface from H2S containing bottom waters. This transition zone is characterized by steep gradients of various components as for instance Mn whose behavior is tightly coupled to Fe and P. Contrasting to e.g. the Black Sea, which is subjected to euxinic bottom waters since about 8,300 years, the deeps of the Baltic Sea are comparatively dynamic ecosystems. Frequently occurring inflows of salty waters from the North Sea partly cause complete oxygenation of the deeps thereby representing an important trigger for the formation of sedimentary Mn-rich layers consisting of Mn carbonates and even Mn sulphide (e.g. Huckriede and Meischner, 1996; Lepland and Stevens, 1998).
Here we present high-resolution geochemical data of surface sediments from the Gotland Basin and Landsort Deep along with trace metals signatures of Mn-rich particles from the pelagic redoxcline. Particles and sediment composition reveals specific similarities for certain redox-sensitive trace metals and thus clearly document the impact of redoxcline-derived material on authigenic mineral formation within the sediments. Temporal comparison of the sediments from the Gotland Basin with instrumental data from the water column partly allows correlation of Mn carbonate layers with inflow events especially for the period between the early 50‘s and late 70‘s when oxygenated waters regularly entered the basin. However, prominent inflows in 1993 and 2003, which occurred after stagnation periods, are hardly detectable in the sedimentary record. Sediments and pore water data highlight most intense element cycling in the deepest part of the Landsort Deep, where partly extremely Mn-rich layers are found until the late 90‘s. The comparison of instrumental and sediment data from different water depths strongly suggests a redoxcline positioned comparatively close to sediment as an important prerequisite for elevated formation of authigenic Mn-rich minerals.
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Huckriede H, Meischner D (1996) Origin and environment of manganese-rich sediments within black-shale basins. Geochim. Cosmochim. Acta 60, 1399-1413.
Lepland A, Stevens R L (1998) Manganese authigenesis in the Landsort Deep, Baltic Sea. Mar. Geol. 151, 1-25.